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3,552,759

HEEL RETAINER FOR SKI BINDING

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ABSTRACT OF THE DISCLOSURE

Heel retainer for ski binding having a support retained on the ski or its base plate and a top part to be optionally latched for starts and unlatched for competition or cross-country runs and which carries the sole retainer and is connected with the support and may be raised from the support by a certain amount for cross-country runs, whereas the support there is provided an inner housing encompassing the release elements, retaining springs and the like and which effects the release, while the top part is in the form of an outer housing that can optionally be latched by a releasable latching device and where between the outer housing and the inner housing a controlled guiding means is disposed which with the latching means released permits displacement of the outer housing upwardly in accordance with the raising of the ski boot for competition runs.

BACKGROUND OF THE INVENTION

The present invention relates to ski bindings. More in particular the invention concerns a heel retainer for a ski binding which has a lower part or support retained on the ski or by its base plate and a top part that may optionally be latched with the support for starting and unlatched for competition events, which carries the sole retainer and is connected with the support, while it can be raised by a predetermined amount from the lower part or support for competition runs. In the position for starts the retainer must press the heel firmly against the base plate of the ski, while in the position for competition runs the ski must, of course, be held, but raising and lowering of the binding by a certain amount from the base plate must be permitted.

In known heel retainers of this type optional adjustment for competition runs or for starts is made possible by means of parallelogram gears or bars or additional guide bars. However, such forms of construction are relatively expensive and require considerable space. Due to the relatively large number of joints required for this purpose there results an undesirable amount of tolerance and, therefore, inaccurate lateral guidance of the sole retainer. Furthermore, it is a disadvantage that the housing of the heel retainer is partly open and consequently it can be plugged up by snow. The same applies for the joint gear members when adjusted for competition runs. The latching of the top part with the lower part or support in the setting for starts as well as the releasing of these parts for competition runs is effected by means of rollers and levers. It is relatively complicated and, therefore, correspondingly expensive, as well as subject to failure or jamming.

SUMMARY OF THE INVENTION

It is an object of the invention to obtain with such a heel retainer structurally simple, yet functionally dependable, optional shifting from competition or cross-country runs to starts and vice versa, while avoiding the aforementioned shortcomings of such a heel retainer. For this purpose, it is proposed in accordance with the invention

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to provide as a support or bottom part an inner housing that encompasses the release elements, retaining springs and the like, and which actuates the release, that the top part is in the form of an outer housing and can optionally be latched with the inner housing by means of a releasable latching means or device, and that between the outer and inner housing a controlled guide means is provided which when the latch means are released, permits displacement of the outer housing upwardly in accordance with the raising of the ski boot during competition runs. All structural components are effectively shielded against snow and ice due to the use of an inner and an outer housing. The proposed arrangement requires only little additional space. Thus in accordance with a preferred embodiment of the invention it is sufficient to provide two each meshing, leverlike toothed segments as controlled guide means left and right on the outer surfaces of the side walls of the inner housing, which require practically no space. Over these toothed segments the outer housing is placed, which likewise requires hardly any additional space, which segments may in the simplest manner be stamped out of sheet metal.

Further advantages of the invention reside in its simplicity, in that the number of the connecting joints necessary for the controlled guidance may likewise be very small. This reduces the production costs and, besides, imparts considerable strength to such a retainer. Above all, the outer housing and the sole retainer which is preferably rigidly connected with the outer housing have imparted to them, owing to the controlled guide means, that movement which the top part must effect with respect to the lower part during competition runs. In addition, the required firm retention transversely of the longitudinal extent of the ski is obtained. This retention in transverse direction can still be improved in that the toothed segment levers can directly engage the outer surfaces of the side walls of the inner housing. Additional reduction in cost and simplification in production is obtained in that the inner housing and the release mechanism permit the further use of those parts and tools which are already available from a heel retainer for starts of known construction. For example, this may be the heel retainer in accordance with Pat. No. 3,378,371. Then it is only necessary to provide bores for mounting the controlled guide means and the latching device and to connect these components with the outer housing and on it the sole retainer.

It is of particular advantage that the skier during competition runs need only move the weight of the outer housing upwardly while the relatively heavy release mechanism is located in the inner housing and consequently on the ski. In spite of this there results just as reliable a release in the event of overload in the setting for competition runs as in the setting for starts. In the known heel retainer initially described, the release mechanism is disposed in the top part and must therefore continually be raised up during competition runs.

BRIEF DESCRIPTION OF THE DRAWINGS

Further advantages and features of the invention will become apparent from the following specification with reference to the embodiment illustrated in the accompanying drawings, in which

FIG. 1 is a side view of the inner housing with the means for the controlled guidance, and with the outer housing shown in dashes in the position for competition runs as well as in the position for starts shown in dot and dash lines only in part,

FIG. 2 is a section along the line II—II in FIG. 1 where the outer housing is in position for starts,

FIG. 3 shows an exploded view of the inner housing 1 and of the release components contained therein, and

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FIG. 4 is a longitudinal section through the inner housing with the essential components of a manual release means and the outer housing indicated in dot and dash lines in the position for starts.

DESCRIPTION OF THE INVENTION

The heel retainer for holding down the ski includes, first of all, an inner housing. In it are located the release means which can be constructed as desired. The inner housing is pivotally connected to a base that is in fixed position in relation to the ski, for example on the base plate, so that when released with respect to the base or support portion it can execute a rocking or pivotal movement upwardly or downwardly. In general the inner housing can be guided in the area of its rearward end remote from the side of the boot for sliding movement on the support longitudinally of the ski against a spring bias (see FIGS. 3 and 4). For details reference is made to prior Pat. No. 3,378,371 and application Ser. No. 662,721. In lieu of this a different arrangement would also be possible.

The outer housing 2 surrounds the inner housing and carries the sole retainer 3 as well as the stepping plate 4. For the sake of clearness the outer housing is illustrated in FIG. 1 only in dashed lines in the position of competition runs and in the position for starts only partly in dash and dot lines. The sole retainer is preferably adjustable for height and is rigidly mounted on the outer housing. By means of the latching device 5 (see FIGS. 3 and 4) the inner and outer housing may be optionally interlocked.

Between the outer housing 2 and the inner housing 1 a controlled guide means is provided in the manner of controlled drive elements, which in this embodiment comprises four toothed segments 6-9 in lever form which are linked in pairs to the outer surfaces of the two side walls of the inner housing 1 by means of rivets 10. The connection of the controlled guide means with the outer housing is preferably by way of slot or slide links, which here are in the form of slots 11 in the ends of the levers, engaged by rivets or pins 12 secured to the outer housing.

The manner of operation is as follows:

When the outer and inner housing are latched to one another by way of the latching device 5 the outer housing and the sole retainer are held in the position indicated in dot and dash lines (see also FIG. 4) and thus force the heel of the ski boot firmly against the support or base plate. This is the position for start runs. If the latching means 5 is released, however, the outer housing 2 can be lifted up from the inner housing 1 into the position for competition runs shown in interrupted lines in FIG. 1.

A release for excessive loads is insured in the position for starts as also for competition runs, because the means for the controlled guidance effectively transmit in both cases the forces from the boot to the inner housing. This applies for the upwardly directed forces (forward fall) as well as also for the laterally directed forces (torsion fall). In addition the heel retainer in accordance with the invention can be elastically supported in the position for start runs with respect to the base or support plate longitudinally with respect to the ski.

By means of the controlled guidance it is accomplished that on raising the forward end of the outer housing comprising components 3, 4, also the rearward end is raised. In the present embodiment this is effected in the manner that when the levers 6, 8 are pivotally moved about their joint axes 10 and meshing of the toothed segments opposite pivoting of the toothed segment levers 7, 9 is obtained, which results in raising of the rearward end of the outer housing. Since the outer housing is displaced substantially vertically upwardly or downwardly, while the lever ends describe an arc, the slots 11 which have already been mentioned are provided for compensating for these movements. Thus the outer housing in its unlatched condition can follow all upward and downward movements of the heel.

FIG. 1 illustrates that the distance a of the left joint axle 10 from the center line of the teeth is greater than

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the corresponding distance b of the right joint axle 10. Owing to this change of the transmission ratio of the toothed segments the outer housing is in its raised position displaced upwardly more at its rearward end than at its forward end that carries components 3, 4. A line drawn in this position through the pins 12 therefore forms the angle α shown in FIG. 1 with that line which passes through these components in the latched position. The angle α corresponds to the angular position of the boot during competition runs. Since during its movement in competition runs the heel moves along an arc centered at the point of the boot, the forced engagement of the binding always remains under the force at which the binding is set.

A particularly firm and stable guidance of the outer housing is obtained in that the inner housing forms at the same time the abutment limits and/or the slide guidance for the outer housing or for its components that move along as the latching device is unlatched. In accordance with the embodiment shown the pins 12 are surrounded by sliding rollers 13 for this purpose which slide along the forward and rearward end surfaces 14, 15 of the inner housing or engage the same to roll on them. For this purpose the end surfaces 14, 15 may be inclined for adaptation to the arcuate rocking movement of the outer housing explained above; preferably they may extend along an arc. In accordance with the desired rocking movement of the outer housing the curvature or shaping of the front end wall 14 of the inner housing may be different from that of the rearward end wall 15.

Furthermore, damping means may be provided (not illustrated) which on reaching the true end position of the outer housing absorb the kinetic energy of these parts. These may be elastic springs or rubber blocks. Also the use of rubber rollers or buffers between the outer housing and the ends of the toothed segment lever would be possible.

An embodiment of the displacement and release means is illustrated in FIGS. 3 and 4. FIG. 3 illustrates respectively and in an exploded view only those parts which in the event of a release and/or a rearwardly directed pressure load, permit upward rocking and simultaneously rearward displacement of the inner housing. On the other hand, FIG. 4 shows essentially merely those parts which serve for release of the binding by hand or with the aid of the point of the ski. In actual practice, of course, the components in accordance with FIG. 3 as well as also in accordance with FIG. 4 are provided in the heel retainer. Besides that the outer housing 2 is also indicated in FIG. 4 in dot and dash lines.

The base plate 16 is provided with lateral cheeks or jaws 17, at the rearward guide slots 18 of which the inner housing is slidably guided by means of a pin 20 which passes through the bores 21 in the side walls of the inner housing. Two rocking straps 22 are pivotally movable in bores 24 in the jaws 17 by means of bolts 23. Besides there is a pivot connection provided by means of pin 27 between bores 25 of the forward rocking ends and the bores 26 of the inner housing. In further bores 28 of the jaws 17 a pawl or claw 30 is pivotally mounted by means of the pin 29 behind which in the operating or driving position the pin 27 enters.

For releasing the binding a spiral pressure spring 32 is disposed at the rearward bearing surface 31 of the claw 30 which is supported at its other end at an adjustable threaded counter bearing 33 of the inner housing. At the upper end of the claw 30 a lever 34 is connected which at its other end is pivotally connected with an angular release lever 35. The release lever 35 is pivotally movable about a pin 20 and projects rearwardly outwardly through registering guide slots of the inner and outer housing. By pressing upon this projecting end manually or with a ski pole the latch claw 30 is pivotally moved rearwardly about the axis 29, and thereby the pin 27 is freed so that the inner housing and the sole retainer

can escape upwardly. The same action takes place in the event of a pressure upon the sole retainer 3 that exceeds the adjusted release force, because then the pin 27 rocks the claw 30 rearwardly against the effect of the spring 32.

The latching between outer and inner housing can be obtained in any manner desired, for example it may be in the form of a snap latch. The embodiment illustrates a turning latch 5 or bolt which is rotatably supported in the inner housing 2 and has a manipulating device accessible from the outside, for example a rotating knob 36 (FIG. 1). A latch pin 37 serves as the lock which in the latched position (position for competition runs) engages the wall of the inner housing 1 from the bottom. If the turning latch 5 is moved by 90° out of this position, then the latch pin 37 can unimpededly pass upwardly through apertures 38 in the upper wall of the inner housing (see FIG. 3) into the unlatched position for starts. On the other hand, the position for competition runs can be rapidly changed to the position for starts. For this the outer housing 2 need merely be moved downwardly, and then the knob 36 is turned so that the pins 37 can pass through the apertures 38. Thereupon the latched position is established by turning the knob 36 through an angle of 90°. By means of suitable devices, for example a friction latch between the latching device and the housing, or a pawl or a resilient ring, etc., one can also obtain that the latch is held in self-locking condition in the position chosen and cannot be inadvertently turned.

Having now described my invention, what I desire to protect by Letters Patent of the United States is set forth in the appended claims.

1. Heel retainer for a ski binding of the type having a lower part including fixed means firmly supported on the ski and an inner housing movable relative to said fixed means, and a top part adapted to be locked to said inner housing for starts and to be unlocked for touring events, said top part being an outer housing having a sole holder projecting therefrom and being movable upwardly relative to said inner housing during touring events, said inner housing enclosing automatically releasable latch elements such as springs and levers operative to effect the unlatching, and said outer housing being disposed about said inner housing and including a locking device for interengagement and interlocking with said inner housing, and controlled guide means disposed between and operatively connected to said inner housing and said outer housing operative upon unlocking of said locking device to permit upward movement of the ski boot during touring, whereby said inner and outer housing are movable as a unit relative to said fixed means.

2. Heel retainer in accordance with claim 1, where said controlled guide means comprise toothed segments each pivotally mounted on at least one side of said inner housing and each having a lever pivotally connected to said outer housing.

3. Heel retainer in accordance with claim 2, where

each said segment defines a unit with its associated lever and said pivotal connections of said levers with said outer housing are in the form of sliding joints.

4. Heel retainer in accordance with claim 3, where said toothed segments of said controlled guide means are so proportioned that the rearward end of said outer housing moves upwardly over a larger distance than the forward end which supports the sole holder.

5. Heel retainer in accordance with claim 4, including slide rollers carried by said outer housing at opposite ends thereof and engaging the end walls of said inner housing for movement thereon.

6. Heel retainer in accordance with claim 5, where said end walls of said inner housing on which said rollers move are arcuately curved thereby imparting to the outer housing an arcuate movement focusing at the point of the ski boot.

7. Heel retainer in accordance with claim 6, where the curvatures of said end walls are of different arcuation.

8. Heel retainer in accordance with claim 2, where said controlled guide means defined by said levers are in sliding engagement with the walls of the inner housing and are also in engagement with the lateral inner walls of the outer housing.

9. Heel retainer in accordance with claim 5, including pins or the like supported by said outer housing proximate opposite ends thereof and extending through said slide rollers, and where said levers present slots at the ends thereof through which said pins extend.

10. Heel retainer in accordance with claim 9, where a stepping plate extends forwardly of said outer housing for engagement by the heel of the ski boot.

11. Heel retainer in accordance with claim 1, where said locking device is rotatably disposed in said outer housing and presents a manipulating knob externally of said outer housing and a locking member within said outer housing, and said inner housing has an aperture adapted to receive said locking member.

12. Heel retainer in accordance with claim 11, where said aperture presents slots on opposite sides for receiving said locking member.

13. Heel retainer in accordance with claim 1, wherein said fixed means is a base plate having jaws extending upwardly therefrom and longitudinally of the heel retainer, said jaws and said inner housing having aligned apertures and a pin extending through said apertures transversely of the heel retainer and defining a pivot axis for said inner housing.

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